

## BRIEF COMMUNICATION

**Meiotic Anomalies Induced by X-rays in *Capsicum annuum* L.**

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**Abstract.** Various types of meiotic anomalies in  $M_1$  generation such as multivalents, fragments, bridges, micronuclei, polyads and in particular the multispindle formation, were observed after seed X-ray irradiation in *Capsicum annuum* L. As the dose increased there was a gradual increase in the number of aberrations.

The present studies have been designed to employ X-rays as a mutagenic agent on *Capsicum annuum* with a view to study meiotic anomalies which were likely to appear in the experimental material due to irradiation.

The seeds of *Capsicum annuum* L. bearing the No. NP 46 A were obtained from the National Seeds Corporation of India. The dry seeds were exposed to X-rays at the Radium and Cancer Institute Hyderabad. The administered doses were 1 kR, 2 kR, 3 kR, 4 kR, 5 kR and 10 kR. The dosage rate was estimated to be about  $200 \text{ R min}^{-1}$ . Before irradiation the water content in the seeds was estimated to be 12%.

In order to study the cytological and morphological variations the irradiated seeds along with the controls were sown in the experimental plots. The PMCs were fixed in acetic-alcohol (1:3) and squashes were prepared in 1% acetocarmine. For pollen fertility studies freshly dehiscent pollen was dusted on a slide and stained with acetocarmine. Stained pollen grains were taken to be fertile and non stained ones as sterile. Nearly 150 plants were analysed in each population. 1000 PMCs were observed to record the anomalies in each treatment.

Meiotic abnormalities such as increased percentage of lagging chromosomes, univalents and multivalents, irregular separation of chromosomes and spindle abnormalities can be induced by X-rays in *Capsicum annuum*.

The presence of these abnormalities increased as the dose increased (Fig. 1). Higher doses caused complicated configurations and resulted in decreasing the chiasma formation. This might be attributed to the failure of chiasma formation as a result of complex structural changes in chromosomes or due to change in the nature of the gene, responsible for the chiasma formation (RILEY *et al.* 1966).

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1 kR =  $2.58 \times 10^{-1} \text{ C kg}^{-1}$ .

An increased percentage of anaphase bridges was also observed in certain cells of higher doses.

Multipolar spindle was recorded at telophases and anaphases I and II. It has been suggested (DARLINGTON 1937) that the compact spindle results in the divergence of groups of chromosomes to form 3—4 and 5—6 nuclei at telophases. The expected tetrad abnormalities such as the formation of polyads after separation of daughter chromosomes at telophase II were observed.

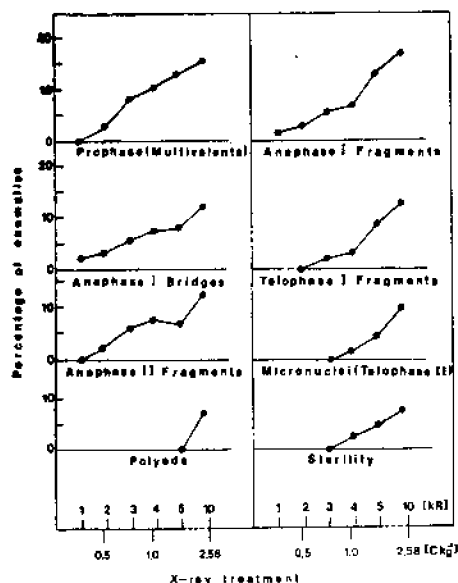


Fig. 1. Different meiotic anomalies in  $M_1$  population of *Capsicum annum* after X-ray irradiation.

The pollen sterility was low in percentage when compared to the abnormalities and it was recorded at higher doses only (Fig. 1). The pollen sterility might be due to heavy damage and abnormalities of chromosomes encountered during meiosis. Not only the abnormalities but also physiological and genetical damages induced probably by the breakage of chromosomes through the formation of antimetabolic agents in the cells might be responsible for the sterility of the pollen.

There was a proportionate increase of abnormalities according to the dose but no correlation between the chromosomal aberrations and the relative morphological changes could be drawn in the case of *Capsicum annum*. Even though the percentage of abnormalities at 10 kR was high, the lethality of the seedlings was not recorded.

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